Facial Vein Approach by Direct Puncture at the Base of the Mandible for Dural Carotid-Cavernous Fistula

An alternative to the Superior Ophthalmic Vein Approach

A Case Report

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Summary

A new facial vein approach by direct puncture at the base of the mandible is described for the treatment of dural carotid-cavernous fistulas. The facial vein is easy to identify, expose, and cannulate compared with the superior ophthalmic vein. The facial vein approach provides an alternative to the superior ophthalmic vein approach when the inferior petrosal sinus approach has failed.

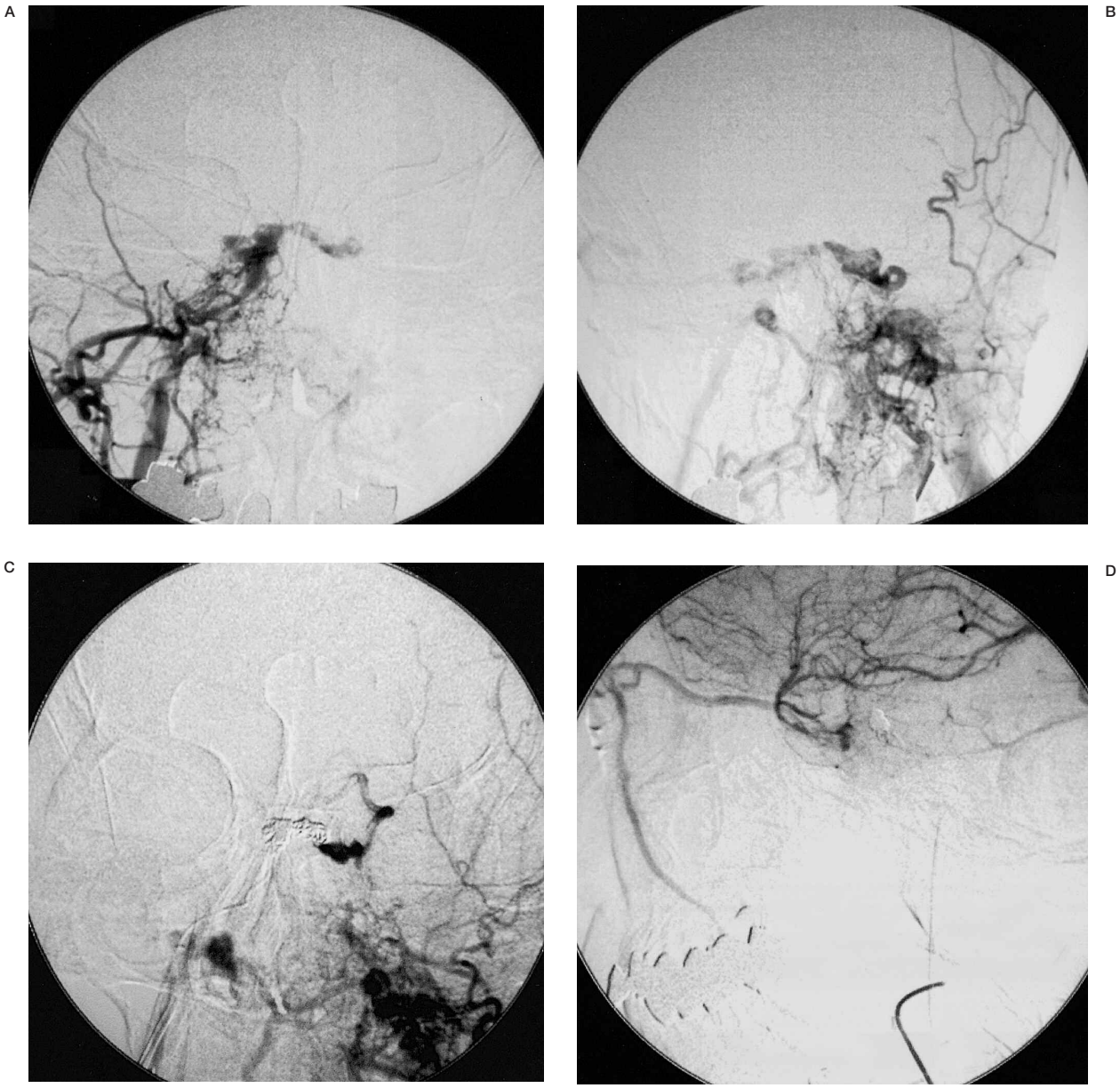
Introduction

Dural carotid-cavernous fistulas (CCFs) are now usually treated by the inferior petrosal sinus (IPS) approach [1,2]. However, stenotic or occlusive lesions of the IPS often associated with this disease may hinder this approach. Catheterization of the IPS may be possible even if the IPS is not detected by angiography [1,3], but this is not always successful. The superior ophthalmic vein (SOV) approach is recommended in patients with predominant venous drainage to the SOV or when the IPS approach has failed [4,5]. However, the SOV approach has the disadvantages of difficulty in identifying the SOV, damage to the trochlea, bleeding from the SOV, and infection [4,5]. The surgical cut down technique of the SOV has been described [4], but support from the ophthalmologist is sometimes required. We describe the facial vein approach through direct puncture at the base of the mandible as an alternative to the SOV approach.

Case Report

A 69-year-old woman presented with pulsatile tinnitus, right abducens nerve palsy, left exophthalmos, and chemosis. Digital subtraction angiography revealed a dural arteriovenous fistula of the cavernous sinus fed by the bilateral external and internal carotid arteries (figures 1A,B). The right IPS was stenotic and the left IPS was not visualized. We considered that the fistula was located in the right cavernous sinus and the shunt flow drained into the right IPS and the left SOV via the intercavernous sinus.

Therefore, the intercavernous sinus and the right cavernous sinus were embolized using Guglielmi detachable coils (GDCs) (Boston Scientific Co.) and fibered coils (Turfil; Johnson & Johnson Co.) through the right IPS approach. Right common carotid angiography showed obliteration of the fistula, but left external and internal carotid angiography showed residual shunt flow at the left cavernous sinus (figures 1C,D). We tried the left IPS approach and transfemoral facial vein approach, but failed to access the left cavernous sinus because



the IPS was occluded and the facial vein flowed into the subclavian vein via the jugular arch without connection to the internal jugular vein.

Her left exophthalmos and chemosis did not improve during the follow-up period of four months. Therefore, the facial vein approach by direct puncture was performed under local anesthesia. A 2 cm transverse skin incision was carried out at the base of mandible with reference to the pulsation of the facial artery (figure 2). The facial vein was easily identified and exposed. The vein was punctured with a 22 gauge teflon needle, then a 0.016 inch guidewire was introduced into the left cavernous sinus via the angular vein and SOV under road map guidance (figure 1E). A microcatheter was introduced into the fistula of the cavernous sinus. GDCs and fibered coils were placed in the left cavernous sinus and SOV until complete obliteration of the fistola was achieved (figure 1F). After removal of the microcatheter, the puncture site was covered with oxidized cellulose and fibrin glue and gently compressed to avoid occlusion of the facial vein. There was little

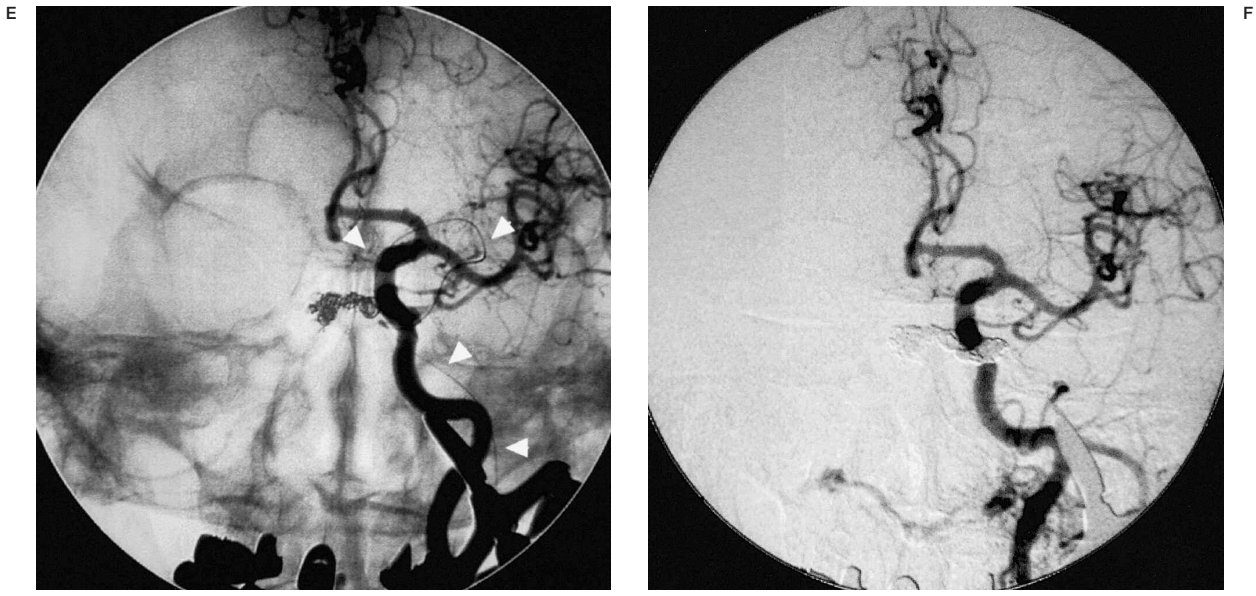


Figure 1 A,B) Right and left external carotid angiograms, anteroposterior views, showing the dural CCF draining into the right IPS and left SOV via the intercavernous sinus. C,D) Left external (anteroposterior view) and internal carotid (lateral view) angiograms after first embolization by the right IPS approach showing a residual shunt flow at the left cavernous sinus draining into the left facial vein via the SOV. E) Left internal carotid angiogram, anteroposterior view, showing a 0.016inch guidewire (arrowheads) introduced into the left cavernous sinus via the angular vein and the SOV by the left facial vein approach. F) Left common carotid angiogram after second embolization, anteroposterior view, showing complete obliteration of the fistula.

bleeding during the procedures. Subsequently, her ocular symptoms completely disappeared.

Discussion

The facial vein approach by direct puncture has some advantages over the SOV approach. The facial vein is easy to identify at the base of the mandible because the facial vein runs lateral to the facial artery, which can be identified by its pulsation, without variation [6,7]. Exposure of the facial vein is easy because of the superficial location and the absence of edema. The facial vein runs straight to the angular vein, so this straight segment supports the introduction of the microcatheter into the winding SOV and prevents pulling off of the microcatheter during the procedures. However, there may be a little difficulty in advancing the microcatheter into the SOV at the junction of the supratrochlear vein in some cases.

Even if unexpected occlusion of the facial vein occurs before incomplete closure of the fistula, collateral flow through the supratrochlear vein, retromandibular vein, and contralateral angular vein [6,7] may prevent rapid deterioration of the ocular symptoms.

Incision of the mandibular region causes less psychological pressure on the patient and the operative scar is less conspicuous than that on the eyelid.

Conclusions

The facial vein approach is easy and safe, and is a good alternative to the SOV approach when the IPS approach or transfemoral facial vein approach has failed, although further experience is needed to certify the usefulness of this approach.

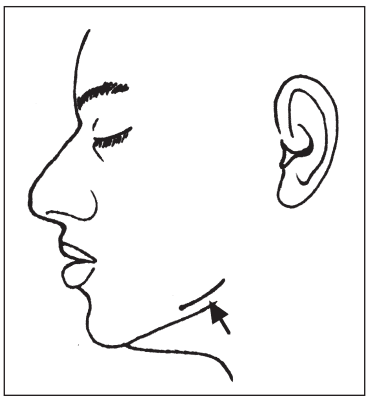


Figure 2 Site of the incision (arrow) for the facial vein approach by direct puncture at the base of the mandible.

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EDITORIAL COMMENT

The authors report an additional alternative technique to treat dural shunts of the parasellar region. Although they claim that such lesions are usually "treated by the inferior petrosal sinus", most cases are still treated by transarterial approach with success.

Liu Tan et Al: Long term clinical outcome of spontaneous carotid cavernous sinus fistulae. Neuroradiology 43 : 1007-1014, 2001.

Variations are also present in the opening of the facial vein : Choudhry R, Tuli A, Choudhry S: Facial vein terminating in the EJV. An embryologic interpretation. Surgical Radiol Anat 19 (2): 73-77, 1997.

In addition, a high percentage of these lesions do regress spontaneously with embolization of the external carotid as promoted in the late 70's. Manual compression is also highly successful in cases where the lesion exclusively drains into the superior ophthalmic vein. The compression is usually performed on the medial canthus region a few hours a day for one week. The bilateral character of dural arteriovenous shunts of the parasellar region is always difficult to assess and many studies claim bilaterality where in fact bilateral trans-sellar venous drainage fills both sides. Many of the bilateral lesions correspond also to osteous shunt often misdiagnosed as epidural lesion. Such lesions are particularly frequent in females in this topography.